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PATENT APPLICATION OF  
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ENTITLED  
FOLD-DOWN CHUTE FOR SNOW BLOWER

Docket No. M297.12-0298

## FOLD-DOWN CHUTE FOR SNOW BLOWER

### BACKGROUND OF THE INVENTION

The present invention relates to a folding discharge chute for a rotary snow blower attachment  
5 for various prime movers, for example, a skid steer loader. The snow blower includes a feed auger, and an impeller that will project snow upwardly through a chute to a high loading level. The chute includes an upper section that is held in place during use, and  
10 when in storage, is folded so that the upper end of the upper section points downwardly from its hinged point and is supported on an upper edge of the snow blower housing.

Various rotary snow blowers have been  
15 advanced in the past. These include attachments that go on the front end of skid steer loaders, and which have feed augers that will engage the snow and move it in toward a central impeller that discharges the snow upwardly through an output chute. For example,  
20 U.S. Patent No. 3,075,813 shows a snow blower that has a chute that is adjustable for adjusting the positions of the discharge.

U.S. Patent No. 3,583,084 also shows a conventional rotary snow blower, which has a  
25 discharge chute that includes an upper end that is adjustable for directing the snow in a particular path.

U.S. Patent No. 4,651,452 discloses an apparatus for snow removal that has a discharge chute

that is hinged in the center, so that it can be folded down. It is a laterally extending chute, and when folded, projects laterally from the housing a substantial amount. In addition, it is not supported  
5 on the housing when folded. The folding section is operated with a hydraulic actuator, but the specification does mention that a fixed support can be used in place of the hydraulic actuator.

Bobcat Company, a business unit of  
10 Ingersoll-Rand Company, of Gwinner, ND, has sold a snow blower attachment for its skid steer loaders for several years.

The need for high discharge chutes has increased, particularly where snow is to be loaded  
15 into a truck, and moving it from place to place can be a problem with low clearance overhead structures. Also, storing the snow blower attachment during the summer time and when not in use means that the tall chutes have to be accommodated in some manner. The  
20 present invention relates to a folding chute that has an upper section that will fold down to reduce the overall height of the snow blower attachment, and thus make transport and storage easier.

#### SUMMARY OF THE INVENTION

25 The present invention relates to a snow blower having a high discharge chute that can be used for loading snow into trucks, as it is removed or plowed off a street, and which has a folding upper section to reduce the overall height of the chute.

The chute has an adjustable deflector at the upper end, which can adjust the path of the snow being discharged from the impeller.

The chute is mounted so that it will rotate  
5 about a vertical axis, in order to discharge the snow to the side of the attachment and the prime mover that mounts the attachment. The chute is made in two sections, including a base section mounted onto the snow blower housing, and an upper section that is  
10 hinged to the lower section about a transverse or horizontal pivot axis.

The upper section of the snow blower chute is held in its working position with a strut that pivoted on the upper chute section, and is fixed in  
15 place on the base or lower chute section during use. The strut can be released and used manually for lowering the outer end of the upper snow blower chute section about its horizontal pivot. The strut has a bracket that will rest on the top of the auger  
20 housing for the snow blower attachment and support the upper section in folded or lowered position.

Additionally, springs are provided between the two chute sections adjacent the pivot between the sections. The spring force goes over center and  
25 exert a force tending to hold the upper chute in working position when it is raised, and as the upper chute section lowers, the spring force line moves across the horizontal pivot axis and provides a force urging the outer end of the upper chute section

toward the snow blower housing. This force urges the folded section toward the auger housing and maintains the upper section bracket supported on the upper edge of the housing, when the upper chute section is  
5 folded.

When the upper chute section is to be raised, the strut is used as a manual prop to help in pivoting the chute section upwardly. Again, as the upper chute section moves about its pivot to the  
10 working position, the spring force goes over center and aids in raising the upper chute section to its working position where it can be supported with a strut onto a suitable bracket.

The folding chute is easily used, and  
15 greatly aids in the transporting and storage of the snow blower attachment when it is removed from a prime mover, such as a skid steer loader.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side elevational view of a  
20 snow blower having a folding discharge chute made according to the present invention and installed on a skid steer loader;

Figure 2 is a side elevational view of the device of Figure 1 with the discharged chute in a  
25 folded storage position;

Figure 3 is a side elevational view of the folding discharge chute of the present invention in its working position;

Figure 4 is a perspective view of an attachment bracket for holding a support strut in position, and showing the adjustability of the support strut; and

5                Figure 5 is a front elevational view of the device of Figure 1.

DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

Referring to Figure 1, a rotary snow blower indicated generally at 10 is formed as an attachment  
10 to a skid steer loader 12. The skid steer loader 12 has a conventional attachment plate 14 at the forward ends of lift arm 16, on which a mounting frame 11 for the snow blower attachment 10 is mounted. The snow blower attachment has an auger housing or frame 18,  
15 which includes rear frame supports 11 that attach to the attachment plate 14.

As shown in Figure 5, as well as in Figure 1, the snow blower attachment auger housing has spaced side plates 20, and walls 21 between the side  
20 plates to form the housing 18. The walls 21 include a top wall 22 that is rigid and has a ridge 24 at its upper and forward edge. The snow blower 10 has an auger or rotor at its forward end indicated generally at 26. The rotor is mounted between and on the side  
25 plates 20. The rotor is rotated through the use of a hydraulic motor illustrated only schematically at 28 in Figure 2.

The motor 28 drives the shaft mounting the auger 26, and a separate hydraulic motor (not shown)

drives an impeller or rotor shown in Figure 5 fragmentarily at 30. The rotor 30 is mounted in a rotor housing 32 and positioned at the back of the auger housing 18. The impeller 30 is a conventional  
5 rotating fan type wheel unit that will receive snow from the auger 26, and will drive the snow upwardly through a discharge chute 34.

The discharge chute 34 is mounted to the impeller housing on a swivel 36, and as can be seen,  
10 the chute 34 can be rotated about an upright axis 38. The chute 34 is divided into two sections in the present invention, and including a lower or base chute section 40, and a foldable upper chute section 42. The lower chute section 40 is mounted with the  
15 swivel so it can be rotated, and is braced back to the frame 11 mounting for the snow blower attachment with a wishbone brace structure 44. The brace 44 has a forwardly projecting portion 44 A that has a hub 44B to pivotally support a pivot pin on a bracket 46  
20 at the upper end of the lower chute section 40. The hub and pivot pin permit pivoting of the chute. The brace 44 has lower end 48 fastened back onto the frame 11.

The upper chute section 42 is pivoted to  
25 the lower chute section 40 with a pivot pin 50 that connects brackets on the two chute sections. As can be seen in Figures 2 and 3, the lower chute section 40 has a bracket 52 fixed to an upper end thereof that has a first leg 52A that projects forwardly to

support the pivot pin 50. The bracket 52 also has a depending leg 52B that is used for anchoring a pair of tension springs 54 (one on each side of the chute) at connections 55.

5           The upper chute section 42 has a mating bracket 56 at its lower end, and it includes a portion that receives the pivot pin 50 so it is pivotally mounted. The bracket 56 also extends rearwardly when the upper section is in working  
10 position, as shown in Figure 3, to mount second ends of springs 54 at 58 to the bracket 56.

          Upper chute section 42 has a deflector 60 at its upper outlet end that is pivotally mounted about an axis 62 and is controlled as to its angle  
15 with a hydraulic actuator 64 in a conventional manner. Actuator 64 is a double-acting hydraulic actuator operated by the hydraulic system of the prime mover on which the snow blower attachment is mounted.

20           Upper discharge chute section 42 is supported in its working position with a strut 66, that is attached at a pivot 68 to a bracket 70 on the mid-portions of the upper chute section 42. The bracket 70 is braced back to the bracket 56 with a  
25 load carrying link 72. The strut 66 has its lower end connected to a bracket 74 that is supported with a support bracket 76 back to the lower section 40 of the chute. The bracket 74 is shown in greater detail in Figure 4. It can be seen that the strut 66 has a



threaded adjustment screw 78 at its lower end that is attached to a plate 80 that fits between side plates forming the bracket 74.

5 A removable pin 82 is used for fastening the plate 80 to support bracket 76, and as can be seen, it has a cable 84 that keeps it close to the brackets when the pin is removed. Thus, the strut 66 can be removed from the bracket 76 easily, merely by taking the pin 82 out of the connection.

10 The strut 66 has a rest bracket 88 fixed thereto. The rest bracket 88 has a saddle 90 positioned so that when the strut 66 is folded to its storage position as shown in Figure 2, the saddle 90 rests on the front edge ridge 24 of the snow blower  
15 auger housing.

It can be seen in the folded position, that the upper chute section tilts downwardly. The strut end bracket plate 80 is unattached, and is positioned in front of the snow blower housing.

20 The springs 54 at the pivot 50 as shown in Figures 1 and 3, will exert a force to tend to hold the upper chute section 42 in its working or elected position, so after the strut 66 has been used to manually raise the upper chute section, it can be  
25 pinned in place for use as shown in Figures 1, 3 and 4. When the upper chute section 42 is moved to its storage position, the springs 54 go over center relative to the axis of pivot 50 as shown in Figure 2. This over center movement provides a spring force

that will urge the saddle 90 against the front edge ridge 24 of the snow blower housing 18 so that the saddle 90 will stay in its supporting position during storage.

5           The snow blower 10 then can be released or removed from the skid steer loader on which it is mounted, and the chute section 42 can be left its storage position..

10           The discharge chute 34 thus has a high discharge end in its working position so that it can discharge directly into large trucks, when snow is being removed from streets or parking lots. The upper chute section 42 will fold down so the overall attachment is of a reasonable height when it is in  
15 storage. It can be seen that the height is not substantially greater than the cab of the skid steer loader 12 when the discharge chute is in its folded position.

20           The snow blower attachment 10 will be capable of being moved through standard doors without a problem.

25           The housing 18 acts as a collector for the snow, and the auger 26 will move the snow that is being collected to an opening and into the impeller 30. The discharge chute 34 is directly on the impeller housing 32. The impeller 30 is a rotating element that projects the snow upwardly through the discharge chute 34.

Any type of feed auger or snow collector  
can be utilized, but an impeller or conveyor that  
projects the snow upwardly is used for blowing the  
snow upwardly through the high discharge chute during  
5 use.

Although the present invention has been  
described with reference to preferred embodiments,  
workers skilled in the art will recognize that  
changes may be made in form and detail without  
10 departing from the spirit and scope of the invention.